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## Yields of the Field Experiments 1979

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### 79/W/RN/12 Organic Manuring - Wheat, Sugar Beet, Ley

#### Rothamsted Research

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79/W/RN/12

ORGANIC MANURING

Object: To study, from crop yields and soil analyses, the residual effects of a range of types of organic matter - Woburn, Stackyard B.

Sponsor: G.E.G. Mattingly.

The 15th year, winter wheat, sugar beet, ley.

For previous years see 'Details' 1973 and 74-78/W/RN/12.

Design for winter wheat: 2 blocks of 8 plots split into 8  
sugar beet: 2 blocks of 6 plots split into 8  
ley: 2 blocks of 2 plots.

Whole plot dimensions: 8.53 x 30.5.

Treatments: From 1966 to 1971 the experiment had a preliminary period designed to build up organic matter, derived from different sources. An arable rotation was started on two blocks in 1972 and the remaining two blocks in 1973. Organic manures were last applied in 1971, the leys were ploughed in autumn 1971 and 1972 before starting the rotation. The experiment now tests all combinations of:-

Whole plots

1. MANURE            Organic manures and fertilisers in the preliminary period:
- |          |                                 |
|----------|---------------------------------|
| FYM      | Farmyard manure                 |
| STRAW    | Straw                           |
| PEAT     | Peat                            |
| GREENMNR | Green manures                   |
| FERT-FYM | Fertilisers equivalent to FYM   |
| FERT-STR | Fertilisers equivalent to straw |
| CLOVRLEY | Clover/grass ley, no N          |
| GRASSLEY | Grass ley with N for each cut   |

In the sugar beet blocks treatments PEAT & GREENMNR were sown to clover/grass ley in 1979. (No yields obtained in 1979).

Sub plots

2. N                    Fertiliser nitrogen (kg N):

WHEAT	SUGAR BEET
0	0
30	40
60	80
90	120
120	160
150	200
180	240
210	280

79/W/RN/12

Standard applications:

Winter wheat: Manures:  $P_2O_5$  at 110 kg as superphosphate,  $K_2O$  at 60 kg as muriate of potash. Weedkiller: Methabenzthiazuron at 1.5 kg in 220 l.  
Sugar beet: Manures: Chalk at 5 t, (0:20:20) at 1210 kg in autumn, (0:20:20) at 605 kg in spring. Mg at 60 kg as kieserite. Boron at 8.0 kg  $B_2O_3$  (as 'Solubor') applied with the insecticide. Insecticide: Pirimicarb at 0.14 kg in 250 l.  
Clover/grass ley: Manures: Chalk at 5 t, (0:20:20) at 1210 kg in autumn, (0:20:20) at 605 kg in spring, Mg at 60 kg as kieserite.

Seed: Winter wheat: Flanders, sown at 180 kg.  
Sugar beet: Klein E, sown at 5.6 kg.  
Clover/grass ley: sown at 22.4 kg.

Cultivations, etc.:-

Winter wheat: Heavy spring-tine cultivated, P and K applied, spring-tine cultivated with crumbler attached: 13 Oct, 1978. Seed sown: 14 Oct. Weedkiller applied: 18 Oct. N applied: 18 Apr, 1979. Combine harvested: 29 Aug.  
Sugar beet: Chalk applied: 7 Nov, 1978. Autumn PK applied: 24 Nov. Spring PK and Mg applied, spring-tine cultivated: 30 Apr, 1979. Spring-tine cultivated with crumbler attached, seed sown: 1 May. N applied: 4 May. Singled: 11-15 June. Tractor hoed three times: 18 June, 2 July, 16 July. Boron and insecticide applied: 30 June. Lifted: 1 Nov.  
Clover/grass ley: Chalk applied: 7 Nov, 1978. Autumn PK applied: 24 Nov. Spring PK and Mg applied, spring-tine cultivated: 30 Apr, 1979. Spring-tine cultivated with crumbler attached: 1 May. N applied: 4 May. Spring-tine cultivated with crumbler attached, seeds sown: 4 June. Topped: 30 July.

79/W/RN/12 WHEAT

GRAIN TONNES/HECTARE

\*\*\*\*\* TABLES OF MEANS \*\*\*\*\*

N	0	30	60	90	120	150	180	210	MEAN
MANURE									
FYM	1.82	3.82	5.77	6.06	6.88	5.64	6.18	5.89	5.26
STRAW	1.72	3.90	5.48	6.68	6.42	6.58	6.48	6.00	5.41
PEAT	1.38	3.83	5.52	6.42	6.50	7.13	5.89	6.21	5.36
GREENMNR	1.63	3.58	5.16	5.81	4.99	4.76	5.87	5.08	4.61
FERT-FYM	1.16	3.45	4.73	5.83	5.01	4.76	4.44	4.71	4.26
FERT-STR	1.81	3.69	5.44	6.49	6.87	6.33	5.99	5.81	5.30
CLOVRLEY	2.29	4.28	6.11	6.55	6.98	6.17	6.17	6.13	5.59
GRASSLEY	1.57	3.60	5.19	6.52	6.25	5.79	6.52	6.29	5.22
MEAN	1.67	3.77	5.42	6.29	6.24	5.90	5.94	5.77	5.13

\*\*\*\*\* STANDARD ERRORS OF DIFFERENCES OF MEANS \*\*\*\*\*

TABLE	MANURE	N	MANURE N
SED	0.679	0.151	0.787
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
MANURE			0.427

\*\*\*\*\* STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION \*\*\*\*\*

STRATUM	DF	SE	CV%
BLOCK.WP	7	0.679	13.2
BLOCK.WP.SP	56	0.427	8.3

GRAIN MEAN DM% 84.7

STRAW TONNES/HECTARE

\*\*\*\*\* TABLES OF MEANS \*\*\*\*\*

N	0	30	60	90	120	150	180	210	MEAN
MANURE									
FYM	1.52	2.96	4.27	5.38	4.78	5.40	5.82	6.75	4.61
STRAW	1.62	3.51	5.15	6.15	6.15	6.66	7.10	6.93	5.41
PEAT	1.14	2.57	3.53	5.30	5.86	4.98	6.34	5.70	4.43
GREENMNR	1.36	3.10	4.23	5.02	4.85	4.79	5.48	5.79	4.33
FERT-FYM	1.17	3.10	4.17	4.89	5.40	5.72	5.39	5.32	4.40
FERT-STR	1.54	3.10	4.79	5.29	6.39	5.76	6.33	6.36	4.95
CLOVRLEY	1.66	3.60	5.29	6.27	6.61	7.04	6.77	7.34	5.57
GRASSLEY	1.31	2.79	4.31	4.97	5.92	5.72	6.27	6.53	4.73
MEAN	1.42	3.09	4.47	5.41	5.74	5.76	6.19	6.34	4.80

STRAW MEAN DM% 90.2

SUB PLOT AREA HARVESTED 0.00173

79/W/RN/12 SUGAR BEET

ROOTS WASHED TONNES/HECTARE

\*\*\*\*\* TABLES OF MEANS \*\*\*\*\*

	N	0	40	80	120	160	200	240	280	MEAN
MANURE										
FYM		14.2	25.1	29.6	32.4	33.4	30.6	29.2	32.3	28.4
STRAW		13.1	24.9	30.1	37.6	36.8	32.3	34.6	30.8	30.0
FERT-FYM		8.6	21.4	27.2	29.0	31.1	33.7	27.5	25.7	25.5
FERT-STR		10.1	20.6	29.9	31.7	35.9	34.4	28.2	22.3	26.6
CLOVRLEY		12.3	25.4	34.4	34.4	31.3	32.8	28.8	32.9	29.0
GRASSLEY		16.3	28.3	37.7	40.6	42.5	39.8	39.0	39.7	35.5
MEAN		12.4	24.3	31.5	34.3	35.2	33.9	31.2	30.6	29.2

\*\*\*\*\* STANDARD ERRORS OF DIFFERENCES OF MEANS \*\*\*\*\*

TABLE	MANURE	N	MANURE N
SED	3.11	1.58	4.78
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF:			
MANURE			3.88

\*\*\*\*\* STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION \*\*\*\*\*

STRATUM	DF	SE	CV%
BLOCK.WP	5	3.11	10.7
BLOCK.WP.SP	42	3.88	13.3

SUGAR PERCENTAGE

\*\*\*\*\* TABLES OF MEANS \*\*\*\*\*

	N	0	40	80	120	160	200	240	280	MEAN
MANURE										
FYM		18.0	18.2	18.4	17.7	16.9	16.8	16.4	15.9	17.3
STRAW		17.7	18.0	17.7	17.4	18.1	16.5	16.1	15.8	17.2
FERT-FYM		17.2	18.0	18.1	17.8	17.1	16.6	16.4	16.2	17.2
FERT-STR		17.3	18.1	18.2	17.4	17.5	16.7	16.0	15.9	17.2
CLOVRLEY		17.6	17.8	17.7	17.2	17.1	16.8	16.0	15.8	17.0
GRASSLEY		17.8	18.0	18.4	17.9	17.7	16.8	16.5	16.0	17.4
MEAN		17.6	18.0	18.1	17.6	17.4	16.7	16.2	16.0	17.2

79/W/RN/12 SUGAR BEET

TOTAL SUGAR TONNES/HECTARE

\*\*\*\*\* TABLES OF MEANS \*\*\*\*\*

	N	0	40	80	120	160	200	240	280	MEAN
MANURE										
FYM		2.57	4.58	5.44	5.74	5.64	5.16	4.81	5.13	4.89
STRAW		2.31	4.49	5.32	6.57	6.67	5.32	5.58	4.87	5.14
FERT-FYM		1.48	3.84	4.93	5.17	5.31	5.58	4.51	4.16	4.37
FERT-STR		1.76	3.73	5.45	5.51	6.29	5.76	4.56	3.56	4.58
CLOVRLEY		2.16	4.53	6.11	5.94	5.35	5.49	4.61	5.19	4.92
GRASSLEY		2.91	5.09	6.90	7.24	7.51	6.71	6.46	6.36	6.15
MEAN		2.20	4.38	5.69	6.03	6.13	5.67	5.09	4.88	5.01

\*\*\*\*\* STANDARD ERRORS OF DIFFERENCES OF MEANS \*\*\*\*\*

TABLE	MANURE	N	MANURE N
SED	0.540	0.282	0.842
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF: MANURE			0.690

\*\*\*\*\* STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION \*\*\*\*\*

STRATUM	DF	SE	CV%
BLOCK.WP	5	0.540	10.8
BLOCK.WP.SP	42	0.690	13.8

TOPS TONNES/HECTARE

\*\*\*\*\* TABLES OF MEANS \*\*\*\*\*

	N	0	40	80	120	160	200	240	280	MEAN
MANURE										
FYM		10.1	14.5	19.5	28.8	31.7	33.5	33.8	38.7	26.3
STRAW		8.4	19.4	21.4	30.5	33.5	39.1	42.4	33.8	28.5
FERT-FYM		5.8	12.4	19.4	23.4	29.6	35.6	28.9	28.2	22.9
FERT-STR		7.5	12.2	21.1	24.8	31.7	35.4	30.2	29.1	24.0
CLOVRLEY		8.9	16.2	25.5	29.5	29.8	35.4	36.6	35.6	27.2
GRASSLEY		11.7	19.2	29.5	36.3	37.8	40.8	42.9	45.3	32.9
MEAN		8.7	15.6	22.7	28.9	32.4	36.6	35.8	35.1	27.0

\*\*\*\*\* STANDARD ERRORS OF DIFFERENCES OF MEANS \*\*\*\*\*

TABLE	MANURE	N	MANURE N
SED	2.85	1.34	4.18
EXCEPT WHEN COMPARING MEANS WITH SAME LEVEL(S) OF: MANURE			3.27

\*\*\*\*\* STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION \*\*\*\*\*

STRATUM	DF	SE	CV%
BLOCK.WP	5	2.85	10.6
BLOCK.WP.SP	42	3.27	12.1

SUB PLOT AREA HARVESTED 0.00130